National Institute of Environmental Health Sciences

Modelling adaptive management strategies for coping with the impacts of climate variability and change on riverine algal blooms

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Abstract:

The impact of climate change on hydrology and water resources is one of the most critical issues facing the world in the next few decades. In particular, there is a need to quantify the risks associated with maintaining the security of resource quantity and quality, and to assess the effectiveness of potential management strategies. In this paper, we assess the impacts of climate variability and change on one aspect of river health. A simple model of Anabaena algal bloom occurrence at a weir pool in the lower Murrumbidgee River, Australia, has been coupled to a catchment model that is used to simulate streamflow, irrigation demand and diversions, dam water storage and releases, and decision-making by both irrigators and managers. Long-term climate data are obtained from a statistical downscaling algorithm, which, when applied to global climate model predictions can provide climate data suitable for driving the coupled model under a variety of climatic scenarios. The coupled model is then used to assess the impact of climate variability and projected climate change on the frequency, duration and magnitude of Anabaena blooms. The impact of two management strategies for bloom control are also assessed and it is shown that even a single, quite simple, resource-neutral, adaptive management strategy has the potential to substantially reduce the occurrence and impact of algal blooms and to more than compensate for the deleterious impacts of climate change. This result supports the notion that planning for the future can lead to positive outcomes in the present.

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Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Special Report on Emissions Scenarios (SRES)

Special Report on Emissions Scenarios (SRES) Scenario: SRES A2

Communication:

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

A focus of content

Communication Audience:

audience to whom the resource is directed

Policymaker

Exposure :

weather or climate related pathway by which climate change affects health

Food/Water Quality

Food/Water Quality: Biotoxin/Algal Bloom

Geographic Feature:

resource focuses on specific type of geography

Freshwater

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Australasia

Health Impact:

specification of health effect or disease related to climate change exposure

Other Health Impact

Other Health Impact: Anabaena toxicity

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology:

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Medium-Term (10-50 years)

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

Climate Change and Human Health Literature Portal

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